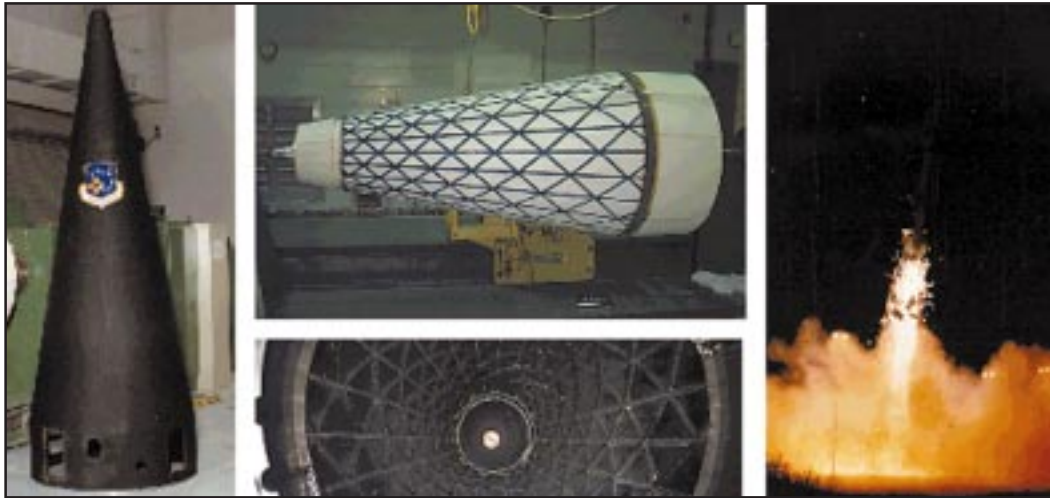




ADVANCED GRID STIFFENED STRUCTURES

LOWER LAUNCH COSTS



35

Payoff

Made of carbon fibers and epoxy resin, advanced grid stiffened (AGS) structures are strong, lightweight, relatively inexpensive, easy to make, and can replace metal rocket body parts. When used as a protective launch shroud over satellite payloads, AGS structures lower launch costs by reducing weight.

Accomplishment

Space Vehicles Directorate (VS) engineers successfully developed a viable manufacturing method for AGS structures. This program resulted in the successful flight demonstration of an AGS Payload Shroud as part of the Ballistic Missile Defense Organization's Combined Experiments Program. This shroud was three times stronger, ten times stiffer and 61 percent lighter than the aluminum shroud it replaced. The technology is currently being transitioned to the Minotaur launch vehicle's fairing.

Background

From 1985-1993, the U.S. and Russian governments spent millions on AGS research without achieving a viable manufacturing technique or flight-quality structure. The VS Directorate's Advanced Composite Shroud Program was the first program to successfully develop robust AGS structures and designs that led to a flight demonstration and eventual transition to a major launch system. The Advanced Composite Shroud Program matured AGS technology to the level required for flight demonstration by developing the first viable AGS analysis and design techniques, and in conjunction with Stanford University, the first viable in-house AGS manufacturing method. This method required a revolutionary approach called "Hybrid Tooling." The Air Force has been granted a patent on this tooling concept. Following the successful demonstration, AGS technology has been baselined on the Minotaur launch vehicle and will be integrated into this operational system by the end of FY00. The Boeing Company has invested \$500K of Independent Research and Development funds to transition this technology. Boeing has subsequently developed an AGS replacement for the Delta II Interstage, and CSA Engineering is developing acoustic suppression systems for AGS structures.